Simple Orchid Culture

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AUTHOR

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ACKNOWLEDGMENTS

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The section on control of insects was prepared by Albert A. La Plante; the section on control of diseases was adapted from University of Hawaii Cooperative Extension leaflet 140, "Orchid Disease Control" by Arthur H. McCain and Mamoru Ishii.

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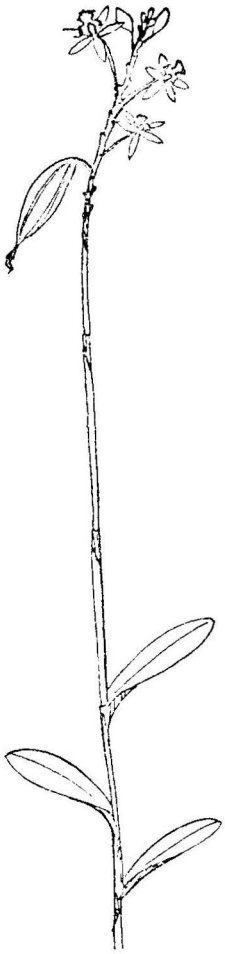
Cover picture: Phalaenopsis 'Mad Lips' – courtesy Rod McClellan Company.



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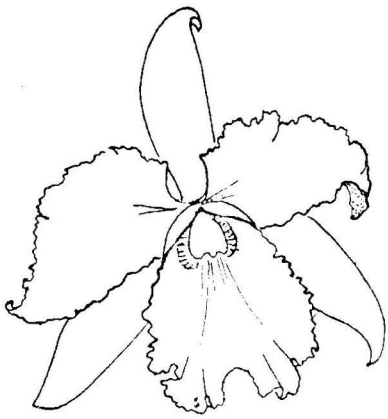


ORCHIDS ARE EASY TO GROW

If you aren't growing orchids you are missing a lot of fun.

Hawaii has the perfect climate for orchids as garden plants. You won't need a glass-house, fern-house, slat house, or other structures to grow orchids in your garden. All you need is a place to grow them, a little basic information and understanding, some imagination, and love of things that grow. If you can grow a hibiscus or papaya, you can succeed with orchids.

The orchid family is large. Individual members require different food, climate and physical surroundings. For example, cattleya will grow on a tree branch. It is one of the epiphytes (rock or tree dwellers) and this is its natural site. It is not a parasite—it just uses the tree for support—so it requires food and water. In its natural setting these come from bird droppings, accumulated vegetative compost and rainfall.

In Hawaii, the climate is perfect for growing certain orchids on trees. All you need to know is what kind of orchids, where to put them on the tree, and how to attach them. Then you must provide water, food and protection from insects by occasional spraying.

These rock and tree dwellers will also grow in pots, beds, or other containers, if you provide the proper material for anchorage for the root system and to hold water and food. Some of the materials used are osmunda fiber, hapuu or tree fern, gravel, rocks and fir bark.

CARE OF ORCHID PLANTS IN FLOWER

In Hawaii, one of the least expensive and most beautiful plants is a potted orchid in flower. No other flowers will give you greater enjoyment for the money you spend.

Here are some suggestions to help maintain orchids in good condition:

Light—Do not place a plant in direct sunlight. Indirect light all day is ideal. If you do not want to feature your flowering orchid in a place that is well lighted, use several plants and rotate them every 3 days.

Water—An orchid in flower should be watered regularly, usually once a day. Water just as often as the plant dries.

Drafts and wind—Try not to place the plant in a direct draft or where the wind will constantly blow on it. Wind dries the flowers and reduces their keeping quality.

Insects—When insects first appear, carefully remove them by hand or wash them off with water. Insecticides applied when the plants are in flower will damage the petals.

After flowering—Cut off the old flower spike with sharp shears at the base of the spike. Place the plant in the garden or on your lanai where it will flower again.

Orchids most suitable as pot plants for the house are: Cattleyas, dendrobiums, vandas, and lady slippers. Examine them at your garden shop; enjoy their beauty in your home.

DENDROBIUMS (CANE ORCHIDS)

In Hawaii, dendrobiums are called "cane orchids." All dendrobiums are basically epiphytes (rock or tree dwellers) but will adapt themselves to bed, pot, or log culture. First, decide where in the garden you want to use them, then select the most suitable culture.

Cane orchids require plenty of sunshine. In a valley, plant them where they will get full sun all day. In regions such as Wahiawa, Kaneohe, Kailua and Makiki, they should have morning sun. In the very hottest locations, such as Koko Head, Kalihi, Waikiki, slight partial shade during the heat of the day is ideal.

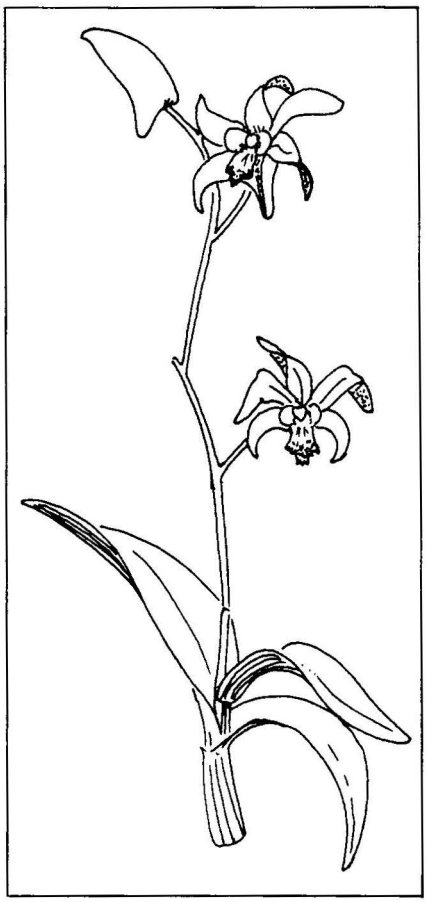
If you are going to grow them in a pot, use shredded hapuu, osmunda fiber, or rough fir bark

as a potting medium.

You also can mount them on hapuu logs—either a half log lying horizontally or a full log standing upright. Bore a hole in the log and place a seedling in it firmly. It will root quickly into the log and, in a short time, produce a solid mat of roots over the surface of the log. Log culture is ideal for the valleys and plains. In the very hot regions, you must provide water every hot day.

Cane orchids grow beautifully in beds, preferably hollow-tile beds raised above the surface of the ground to assure perfect drainage. The bed should be 12 to 14 inches deep. Fill the bottom 6 inches with rough rock or large pieces of coral for drainage. Fill the top 6 to 8 inches with gravel about the size of a lima bean or a small kukui nut. To place the plants, scoop out a hole, lift the plant out of the pot, leaving all the material on the roots, put the plant in the hole and place gravel firmly around the plant to anchor it. It will quickly root into the gravel bed. Such beds have perfect drainage and dry quickly. Heavy watering is needed—the warmer the region, the heavier the watering schedule.

During the hot months, it is advisable to put a mulch of peat moss, shredded hapuu, or similar organic material on top of the gravel. This holds moisture and



cools the rock surface so the heat will not prevent new root growth.

Water by hand or with an automatic sprinkler; saturate the entire bed as often as it gets dry.

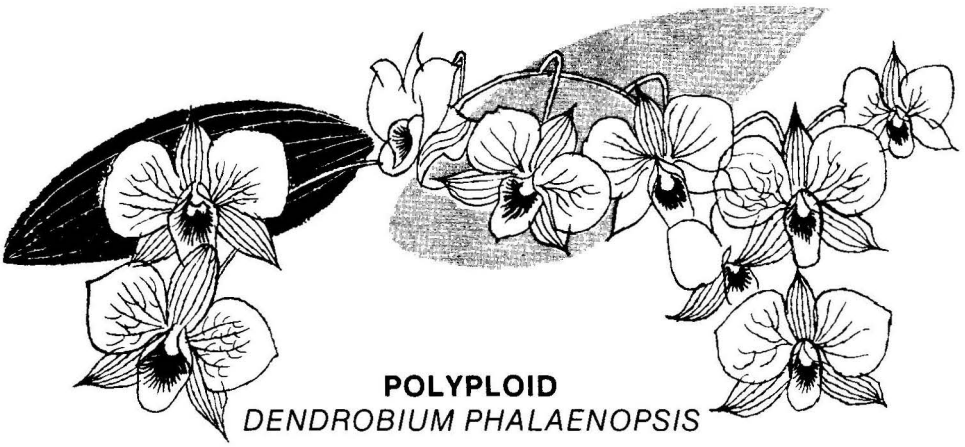
Dendrobiums are beautiful as potted plants. Either a clay or cement pot is suitable. The plants grow to a large size so you will need a big pot. Repot them frequently, always allowing enough room for growth. Ma-

terials suitable for pot culture are shredded hapuu fiber or fir bark. When using fir bark, place the plant in a pot with the back end at the rim and the growing portion toward the center. Hold the base of the plant so that it is 1½ to 2 inches below the pot rim. Fill the pot with fir bark, pressing it in firmly so that the plant is well anchored. Large plants may need staking until they root firmly into the new material.

Shredded hapuu is an excellent material although a little more difficult for the novice to use than fir bark because the material must be packed tightly into the pot with a stick. Hapuu takes on a springlike characteristic when compressed. If you try to force it in the pot, it will pop right out. Place the plant in the pot, then add the hapuu fiber. Work from the center out to the pot rim, pressing the fiber until it is firm and solid. Hold the plant in place during this operation or the force used in placing the fiber will move the plant from side to side.

DENDROBIUM CULTURE CHART

Light:	Dendrobium orchids require sunlight. In the valleys: full sun; lower plains: full morning sun; hot regions: light shade.
Water:	As often as they get dry, except for species and *D. phalaenopsis* types. Keep dry when dormant—late winter to spring. Protect from rain at this time.
Potting media:	
For pots:	Hapuu shredded, fir bark, osmunda fiber; pot firmly.
For beds:	Gravel; in hot areas mulch the top surface.
On logs:	Hapuu logs; drill a hole and place plants in it firmly.
On trees:	Attach firmly to the tree, in a location with good light. Keep some media on the roots until well established. Use wire and staples to attach. *They must be firmly attached* to establish themselves.
Fertilizer:	At least twice a month; use liquid orchid fertilizer according to manufacturer's directions.
Insecticides:	Spray once every 2 weeks with a good all-purpose insecticide that will protect against most insects that are apt to attack dendrobium orchids.
Repotting:	Dendrobium orchids are large plants and need a large container. Repot as often as the medium becomes soft or the plant fills the pot.



POLYPLOID
DENDROBIUM PHALAENOPSIS

Orchids that have the characteristics most persons desire are often polyploid. Polyploid means "many sets of chromosomes." Chromosomes are found in the cells of all living things; in plants they determine the kind of flower. Normally orchids are diploid (two sets). A polyploid may have three (triploid), four (tetraploid) or more sets.

Long before the science of cytology (the study of chromosome counts), orchid growers noted the fine characteristics of some orchids but did not associate them with chromosome counts. Scientists finally found the answer. The University of Hawaii played an important role in this work.

Polyploid *Dendrobium phalaenopsis* types were developed from three basic parents: No. 1) *Dendrobium* 'Diamond Head Beauty,' No. 2) *D. phalaenopsis schroderianum* 'Ruby,' and No. 3) *D. phalaenopsis* 'Giganteum.'

Crosses were made between parents No. 1 and No. 2, and between parents No. 1 and No. 3. The result of these crosses was *Dendrobium* 'Lady Hamilton.' Cytological studies of parents and progeny proved that all were tetraploids (four sets of chromosomes). Thus, where once there were only three parents with these fine qualities, today there are many in the forms of 'Lady Hamilton' and later hybrids.

The plants flower during fall and winter. They are easy to grow and ideal for the warmer parts of the Islands, especially dry regions such as Kahala, Koko Head, Kaimuki, Kalihi, Waianae, Kailua, Waimanalo. If you live in a wet region, you must protect them from rain.

They are best handled as potted plants. Pot them in either hapuu or fir bark. Pot when the new growth starts in late spring and new roots are just starting on the new growth.

During spring and summer (the growing season), water and fertilize freely. They start to flower after maturity in the fall and continue blooming during fall and winter. After flowering, keep the plants on the dry side and let them rest until new growth starts in spring. Then repot them and start the cycle over.

PENDULANT-TYPE DENDROBIUMS

A large number of dendrobiums are suitable as tree dwellers and make beautiful spots in the garden when in full flower. The cane orchids are not the best dendrobiums for tree culture, as they require more light than most trees permit, and plant growth is so heavy that the surface rooting on a tree is sometimes not sufficient to keep the plant firmly anchored.

The best plants for tree culture are the pendulant types of dendrobiums and many of the dainty miniature species. The common 'Hono-Hono' is a good example of the pendulant type; others are *D. nobile* and its varieties and hybrids, *D. pierardii*, and most of the Indian species.

When planting any orchid on a tree, you must first select the best position on the tree. You should consider: 1) direction of prevailing wind and rainfall, 2) direction of the sun—will the position get morning sun, afternoon sun, or filtered light all day, 3) a position that will allow you to water, fertilize, and spray your plant as it needs it.

Once you have selected the proper site, it is a simple matter to "pot" the plant on the tree. Place the plant firmly against the selected spot, leaving a good ball of compost on the roots. With plastic-covered wire and staples, form a network of support that will not allow the plant to move in any way. The plant must be attached firmly so that winds cannot move the plant and tear the new root system before it has a chance to form a solid mass in the new environment. Remember, you can't attach the plant too firmly.

Water the plant freely until it is established, then only when it becomes dry.

STRAP-LEAF VANDAS

This group of orchids has become quite common as garden plants. A few years ago they were rare and expensive.

The strap-leaf vandas are epiphytes (rock or tree dwellers). The large number of hybrids here all stem from a few wild orchids: The two most important are *V. sanderiana* from the Philippines and *V. coerulea* from Asia and India. *V. sanderiana* has a fine, flat flower with an upright, large ball or head of flowers. *Vanda coerulea* is responsible for the lovely blue colors in this group of hybrids. Other important species are: *V. luzonica, suavis, sumatrana, insignis, limbata, tessellata, lamellata,* and *tricolor.*

The majority of strap-leaf vandas are large plants that do well in baskets, pots, or prepared beds in the garden. In the right situation, they also can produce a marvelous effect on a tree. Tree culture does not differ from that of other types of orchids.

To pot in a basket or pot, use hapuu or fir bark. Hapuu should be coarse with little or no dust in it. Pot firmly but in a manner that will allow quick and complete drainage. Some growers prefer to mix small pieces of charcoal with the hapuu to increase drainage. Strap-leaf vandas grow well in pieces of charcoal or in well-washed gravel, particularly in regions where the rainfall is heavy. Volcanic cinders, either red or black, also will provide a good medium. The main points to consider are a large container, firm potting, and good anchorage.

For bed culture in the garden, select a position with proper light—one that gets full morning sun but not the hot sun of noon or late afternoon. Strap-leaf vandas are subject to sunburn that causes unsightly foliage.

Lack of light will cause poor flowering.

Dig the bed 14 to 16 inches deep. Or you may raise the bed the same distance above ground. It may be held in place with tile, cement, or lumber. On the bottom 4 to 5 inches, place large pieces of coral, rock, or crushed cement to allow good drainage. Fill the bed with either a mixture of gravel and tree fern, gravel and fir bark, or volcanic cinders. Either tree fern or fir bark may be added for the hot regions with low rainfall; these materials will help hold and conserve moisture in the bed. For tall plants, use a piece of tree fern as a backing to support the plant and allow additional rooting surface. To plant, dig a hole to fit the rootball of your plant. Remove the plant from the pot, place it in the hole, and firmly press the medium around the sides.

Strap-leaf vandas require plenty of water and should be given a good soaking daily except on rainy or cloudy days. Water early so no water will remain in the leaf axils to rot bud spikes. Vandas also require plenty of fertilizer.

As a garden plant or as a pot plant, strap-leaf vandas are one of our most exciting garden plants.

VANDA CULTURE CHART

Light:	Full morning sun; partial shade after noon.
Water:	Soak thoroughly every day, except on cloudy or rainy days.
Potting media:	
For pots:	Shredded hapuu, fir bark, gravel, volcanic cinder; pot firmly.
For beds:	For hot regions, mixtures of gravel or volcanic cinder plus hapuu or fir bark. For wet regions, straight gravel or volcanic cinders.
On trees:	Attach firmly with good ball of medium until well established; a crotch of a limb is ideal as it affords more support.
Fertilizer:	At least once a week with liquid orchid fertilizer.
Insecticides:	Spray once every 2 weeks with a good all-purpose insecticide.
Repotting:	Pot as often as plant outgrows its container, or when medium deteriorates.

TERETE VANDAS
(PENCILLIKE LEAVES)

Vanda 'Miss Joaquim' (the common vanda known as the lei flower) found its way into Hawaii via Singapore.

Cuttings of the original plants were sent to various gardens in the Islands. They are probably the flower most used for leis. This vanda is easy to propagate. All you need do is cut pieces about 8 inches long, plant them in a box of shredded tree fern or sawdust, keep them moist, and you soon have another plant for the garden. This takes about 4 or 5 months under ideal culture. Thus, starting with a 2-foot piece, you have three plants on the first cut. Six months later you can cut each of these in half and you have 6 plants—another year 24, another 100, another 424, etc., so that in 4 years of intensive propagation you can build up a stock of more than 400 plants from one 2-foot cutting.

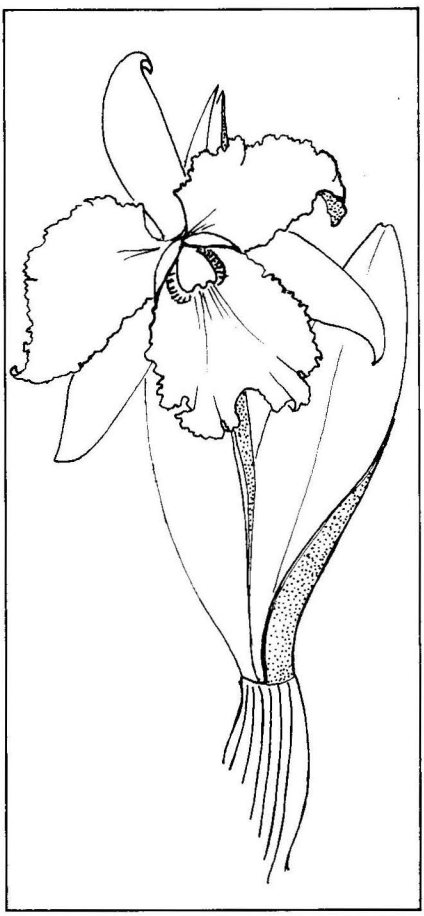
These vandas are grown in the full sun in a well-drained bed with a mulch of sawdust or tree fern. Water heavily every day, fertilize once a week, and cut flowers to your heart's content.

CATTLEYA AND ALLIED HYBRIDS

To most people, the word orchid is synonymous with the genus *Cattleya.* These large-flowered orchids are used by florists for corsages.

Cattleya orchids are really a complex group of hybrids created by combining a number of closely allied species and genera from many parts of the tropical world. All of the wild orchids making up the hybrids originally came from South or Central America or from islands or land masses in these regions. Combined with the genus *Cattleya* in modern hybrids you may find the following genera: *Brassovola, Laelia, Sophronitis, Epidendrum, Broughtonia, Schomburgkia, Diacrium,* and a few lesser ones. Thus, when a plant is named on the tag you will find it as *Lc. (Laeliacattleya), Bc. (Brassocattleya).* When a name gets too complicated, it may be given a name honoring a person.

These crosses were made to combine the most desired qualities of a number of orchids. New colors came from the *Laelia*, large lips from *Brassovola*, interesting new shapes from *Epidendrum* and *Schomburgkia*, red color from *Sophronitis* and *Broughtonia.* Man is never satisfied and must always try to bend nature to his own standards. So the cattleyas you buy and grow in your gardens are a far cry from their ancestors that grew in the jungles of the tropical Americas. Cattleyas are all epiphytes. They are easy to grow on trees, rocks, or tree fern stumps, or as potted plants in baskets or pots.



Media for potted plant culture vary from grower to grower. Any of the following media will be fine if you provide the other factors necessary for good culture: fir bark, tree fern or hapuu, osmunda fiber, gravel or sand mixes including volcanic cinders. Osmunda fiber has been used longer than any other medium. It is excellent and can be used either as shredded fiber, chunks, or as slabs for mounting a plant. Fir bark is the easiest to use, costs are moderate and, if you water and fertilize enough, grows excellent plants. Gravel cultures are easy to use, cost little, but require lots of water and fertilizer.

Cattleyas need protection from the sun. They can be grown in full sun, but an expert is needed to select such a location. On an average, cattleyas require from 25 percent to 50 percent shade, depending on whether you live in a moderate or a very hot location. For the valleys and well-shaded plains, 25 percent shade is fine. Open exposures, low plains, and beach regions require 50 percent shade.

Cattleyas, being true epiphytes, require the basic principle of watering for this group—a complete soaking followed by drying. The time to do this varies from place to place, plant to plant, and time of year. If you know that your plant is saturated from

CATTLEYA CULTURE CHART

Light:	25 to 50 percent shade.
Water:	Saturate, then let them dry completely before repeating.
Potting media:	
For pots:	Fir bark, osmunda fiber, hapuu or tree fern, gravel or volcanic cinder.
On trees:	Attach firmly with good ball of medium until well established. Water more frequently than for pots.
Fertilizer:	Liquid every 2 weeks; orchid organic once every 2 or 3 months.
Insecticides:	Every 2 weeks with all-purpose garden spray, according to directions on package.
Repotting:	As often as it needs a larger container, or when medium deteriorates.

the rain, leave it until it gets dry; you will be watering properly.

Cattleyas are not fast-growing plants and their food requirements are not as great as many other types of orchids. Liquid feeding twice monthly and a side-dressing of orchid organic fertilizer once every 2 or 3 months is adequate.

Cattleyas come in a wide range of colors and varieties. Names mean little unless you are a collector or show grower. The best way to select plants in flower is at your garden shop.

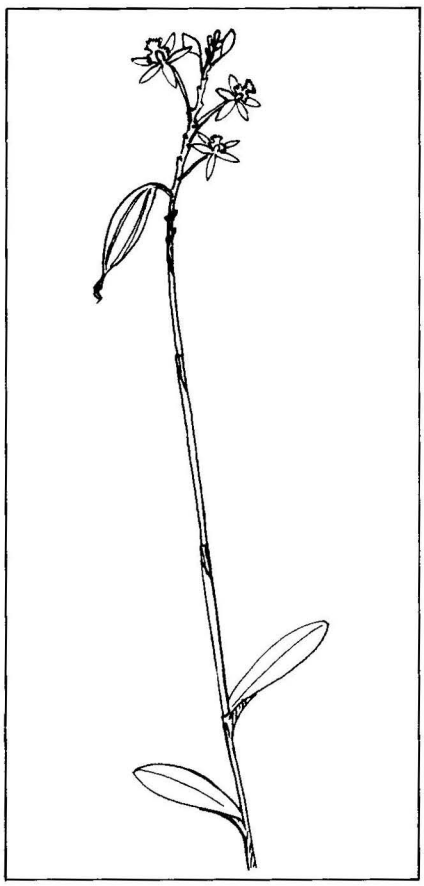
Cattleyas are attacked by a number of insects, and a careful spray program is essential.

EPIDENDRUMS

Between 400 and 500 known species of epidendrums are found, chiefly in Mexico, Central America, the West Indies and south to Brazil. In their native locations they are such rank growers that they can be considered weeds in the pastures.

In Hawaii they are widely used as garden plants. Although epidendrum infers that they grow on trees, many of the species grown locally are terrestrial (soil grown) in their habit. They can be highly recommended to the beginner because they are so easily managed.

Although they will grow in a variety of soils, the common terrestrial types will respond to a mixture of ground hapuu and small stones. In pots they will produce more leafy foliage if the plants are crowded. In beds or borders they may be planted closely and will produce a large number of flowers.



After a year or two, the clumps may be divided after flowering. Small buds arising on the stem will develop into young plants.

Epidendrums may be grown in full sunlight or light shade. They prosper from sea level to higher altitudes. Less shade is needed where temperatures are lower.

Most species flower more during the warmer part of the year. During the actively growing periods they require plenty of water on the roots. Water less during the winter to help prevent the development of black spots on the leaves.

Good growth may be assured by liquid feeding with orchid fertilizer twice a month and a supplement of orchid organic every 2 or 3 months.

Although there are many species of epidendrums, the small-flowering types are most popular as garden plants. Many flowers on the stem over a long period provide orange, red, lavender or yellow flowers—perfect miniatures of cattleyas. Epidendrum hybrids crossed with other members of the genus or with other orchid genera are available for more advanced growers.

RENANTHERA—THE FIRE ORCHID

The renanthera group of orchids is predominantly red. They are easy to grow and make ideal garden plants.

The wild types from which our modern hybrids were developed came from the Philippine Islands, India and parts of Asia. By selective breeding we have developed new and more robust types that make ideal garden or potted plants.

Potted plants can be grown in either a cement or red clay pot. Use either fir bark, Hawaiian tree fern fiber, or a mixture of fiber and gravel.

To plant in the garden, dig a hole about 18 to 24 inches deep and fill with gravel about the size of a small walnut. Place the plant, with a ball of medium as it comes from the pot, into the gravel bed so that the medium is just level with the gravel. As the plant grows tall, place a tree fern log behind it so that it can root into the log.

These plants require light and should have full morning sun. Water daily and fertilize regularly with orchid fertilizer according to the directions on the container.

A grouping of several of these plants will provide a colorful accent in your garden.

PHALAENOPSIS

These orchids, commonly called Philippine moth orchid, are among the loveliest of all spray orchids. They are primarily white or pink, but some of the novelty crosses are producing a few new colors.

In nature, moth orchids are true tropicals and epiphytes. They are ideal plants for the low levels in Hawaii. They require heat, shade, and plenty of water, except at night—one of the easiest ways to kill phalaenopsis plants is to put them where they will get night rains.

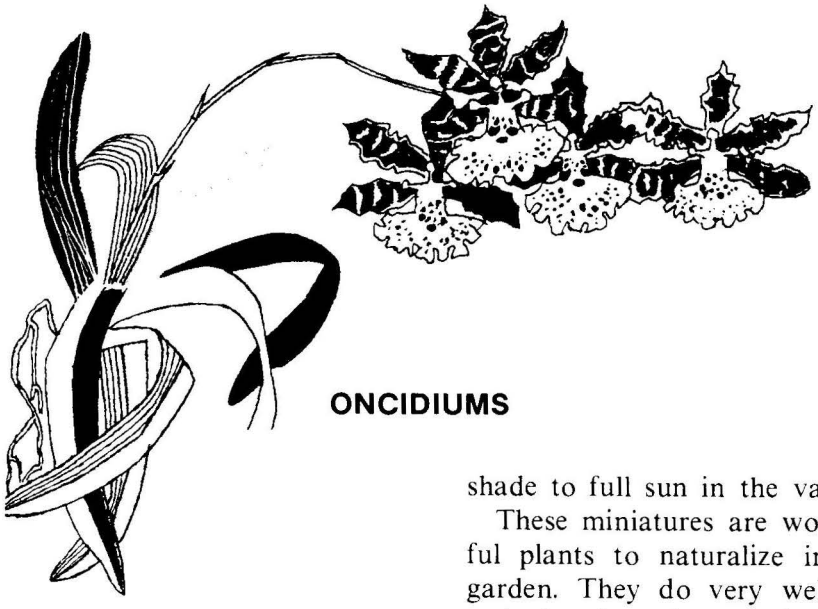
The foliage is soft and will easily sunburn. They require at least 50 percent shade. Roof covering of plastic or painted glass, or diffused light in a lanai or patio is ideal. Never allow your plants to get direct sun.

Phalaenopsis require more water than most epiphytic orchids. They should never become dry. In most locations, water daily in all good weather.

Phalaenopsis grow rapidly. They have a high level of food requirements and benefit from weekly applications of liquid fertilizer.

Thrips and red spider on the undersides of leaves are common on phalaenopsis. Use an all-purpose spray according to directions on the container.

Phalaenopsis are among the easiest orchids to grow if you can provide warm conditions, 50 percent shade, protection from rain, particularly at night, and good cultural practices in watering, fertilizer, and insect control. If you have a tendency to be forgetful, do not grow phalaenopsis. If neglected, they quickly deteriorate.



ONCIDIUMS

Oncidiums are called "dancing ladies." Notice their puffed sleeves, full skirts—really formal ladies.

The three basic types of oncidiums are miniature forms, nonbulbous, and large-growing bulbous.

Miniature forms: 'Delight,' 'Golden Glow,' 'Agnes Ann,' 'Twinkle,' are some of the good ones.

Grow them in small pots, keeping the plants crowded. Medium can be fir bark, osmunda, or hapuu. Water only as often as they are dry. Fertilizer requirements are limited as these plants are small and slow-growing. Liquid feeding once a month is ample. Ideal light is 25 percent shade to full sun in the valleys.

These miniatures are wonderful plants to naturalize in the garden. They do very well attached to branches of plumeria, citrus, ti, or other woody treelike shrubs. Be sure the tree or shrub does not provide dense shade. Simply tie the small plants to the branches, with very little material on the roots. Water daily until established.

Nonbulbous oncidiums: The term nonbulbous is deceiving, as they do have tiny bulbs; but their much larger leaves serve the same purpose as a pseudobulb in most orchids. The leaves may be terete (pencillike) or broad and flat. These are some of the best orchids to grow in a hot dry climate.

They may be grown in pots with either tree fern, osmunda, or fir bark as a medium. Be sure to pot so that the drainage is

good. Water only when dry—fertilize once a month with liquid solutions.

This group of oncidiums also does well mounted on slabs of tree fern or attached to trees. Firmly attach the plant with wire or staples and keep watered until well established—much the same as in pot culture.

Large-growing bulbous oncidiums: Except for the cane-type dendrobiums, no other group of orchids is quite so easy to grow. They take a lot of room but return much in a beautiful display of flowers. Most of them will grow in anything. There is actually one "hedge" of these growing in Honolulu in a hillside garden where the soil is basically black sand. They seem to thrive on it.

For pot culture, you can use any material that will grow epiphytic types of orchids: fir bark, osmunda, hapuu, black sand, gravel, rocks, volcanic cinders, wood chips. Just be sure the pot is large enough to accommodate them and is well drained.

They need full sun, except for the very hottest regions where 25 percent shade is advisable.

Water them as often as they get dry. Fertilize every week with liquid fertilizer.

Spray once every 2 weeks with all-purpose garden spray to keep insects under control.

Oncidium orchids are for everyone. Select those that complement your garden.

MILTONIAS

Most wild types of miltonias come from regions in South America where the temperatures are similar to those found in Hawaii.

Miltonias produce sprays of good-sized flowers in a wide range of colors. They are among the best of the newer orchids for cut flowers, corsages, table decoration, or pot plants.

These plants are closely related to the genus *Oncidium* and their cultural requirements are similar. In the valleys they need morning sun. As you move toward the beach, more shade is required. In warm regions with intense light, such as Diamond Head, Kalihi, Waikiki, 50 percent shade is required.

In nature they stand considerable dryness, so allow them to dry out between waterings. For pots, use a well-drained porous medium. Good potting media are rough Hawaiian tree fern or hapuu, and a coarse grade of bark compost.

Miltonias also grow exceptionally well on fern slabs or logs. To grow in this fashion, select a good piece of hapuu, shaped as you want it. It should be neither hard nor soft—just flexible enough to give with finger pressure. Place the plant on it and attach it firmly with staples and plastic-covered wire. It is most important that the plant be held absolutely firm. If the plant can move, new roots will be torn away each time the plant is disturbed. Remember that log culture requires much more water than pot culture. When you do not have a pot to retain the moisture, the surface of the compost is exposed and dries quickly.

INSECT AND MITE CONTROL

PEST	SYMPTOMS	HOST	CONTROL
Orchidfly	The orchidfly is a small, black wasp about 3/16-inch long. The female lays her eggs directly in the orchid tissue. The eggs hatch and the young larvae bore inside the pseudobulb, causing an enlarged, swollen appearance. When larvae feeding is completed, the insects pupate within the pseudobulb and emerge through a small exit hole as adult wasps.	*Cattleya, Epidendrum, Laelia, Brassovola*	Malathion 2 tsp (57%) emulsifiable concentrate per gal water *or* methoxychlor 2 tsp (50%) wettable powder per gal water
Orchid weevils	The orchid weevil and the lesser orchid weevil are found in Hawaii. Both are small, black, snout beetles ranging from 1/8-inch to 1/4-inch long. The adults drill holes in the orchid tissue with their snouts and lay eggs in the holes. The hatched weevils bore into the tissue. The plant parts are damaged internally and the tissues are blackened.	*Vanda, Dendrobium, Renanthera, Phalaenopsis, Spathoglottis, Grammatophyllum, Arachnis, Epidendrum, Cattleya*	Methoxychlor 2 tsp (50%) wettable powder per gal water
Scale insects	Four scale insects are commonly found on orchids in Hawaii. These sucking insects do not move around after the first active stage. The red orchid scale is circular and reddish brown. The Boisduval scale is circular, thin, flat, and white. The hemispherical scale is brown and rounded like a tortoise. The variable shaft scale is very thin and delicate with a smaller and larger section in the front and white transparent at the back.	All orchids	Malathion 2 tsp (57%) emulsifiable concentrate per gal water *or* diazinon 2 tsp (50%) emulsifiable concentrate per gal water *or* dimethoate (cygon) 2 tsp (23.4%) emulsifiable concentrate per gal water
Aphids	Three aphids are found on orchids in Hawaii. The fringed orchid aphid is black with a white fringe around it and looks more like a scale than an aphid. It is often protected at the base of the plants by earthen tents made by the big-headed ant. The orchid aphid is pale green and may be found on the flower, foliage, and terminal shoots. The bean aphid is dark brown to black and is often found on young flower spikes.	*Vanda, Dendrobium, Epidendrum,* commonly found on *Cattleya*	Malathion 2 tsp (57%) emulsifiable concentrate per gal water *or* diazinon 2 tsp (50%) emulsifiable concentrate per gal water *or* dimethoate (cygon) 2 tsp (23.4%) emulsifiable concentrate per gal water

Mites	Orchids are attacked by spider mites and false spider mites. Mites are hard to see with the naked eye. They have eight legs. The carmine spider mite is most frequently found on the undersides of *Cymbidium*. It can be recognized by its bright red color. False spider mites are black and red, and include the Pacific spider mite which is often found on *Phalaenopsis*. Other false spider mites feed on *Oncidium, Odontoglossum, Dendrobium*, and others. Mite damage silvers the undersides or, in one case, the uppersides of the leaves.	*Cymbidium, Phalaenopsis, Oncidium, Odontoglossum, Dendrobium*	Acaraben (chlorobenzilate) 2 tsp of emulsifiable concentrate per gal water *or* diazinon 2 tsp (25%) emulsifiable concentrate per gal water *or* dicofol (kelthane) 2 tsp (18%) emulsifiable concentrate per gal water *or* wettable sulfur 3 tsp (95%) per gal water
Thrips	The commonest thrips on orchids are the Hawaiian thrips and the vanda thrips. These are small, narrow active insects. The Hawaiian thrips cause silvery feeding symptoms on the leaves and the damage looks like a flower-breaking virus on the flowers.	*Cattleya, Epidendrum, Vanda* and others	Malathion 2 tsp (57%) emulsifiable concentrate per gal water *or* diazinon 2 tsp (25%) emulsifiable concentrate per gal water
Snails and slugs	Orchids are attacked by the giant African snail, small garden snail, the black slug and the garden slug.	*All orchids*	Snail bait or handpick

DISEASE CONTROL

DISEASE	SYMPTOMS	CONTROL
Black rot and seedling damping-off	Starts as small, water-soaked leaf spots and root rot. Decay may progress rapidly. Affected tissues turn black.	Avoid overhead irrigation and provide good aeration. Drench seedlings at 7-day intervals with Dexon (35%), 1 tbsp. per gal water. Steam or chemically treat growing media and used pots.
Bacterial brown spot	Sunken, black spots with definite margins. Start as small, water-soaked spots. Not fatal to *Cattleya*. Disease is serious on *Phalaenopsis* seedlings and may be fatal.	Avoid overhead watering and provide good aeration. Observe strict sanitation. Keep benches clean and dry and painted with copper naphthenate.
Bacterial soft rot	Soft, watery rot of leaves, often foul-smelling. Starts as small, water-soaked area. Infection is through wounds. Often fatal.	Clorox diluted 1 cupful to 9 cupfuls of water. Apply with cotton swab directly to leaf spot.

DISEASE CONTROL (CONTINUED)

DISEASE	SYMPTOMS	CONTROL
Bacterial brown rot	A disease of *Cypripedium*. Small, round, water-soaked, yellow spots, turning chestnut brown. Often fatal.	Disinfect tools between cuts with Clorox diluted 1 cupful to 9 cupfuls of water.
Gloesosporium leaf spot	Prominent, sunken, reddish brown spots with definite margins. Spots start as minute, dark areas, frequently at the leaf tip. Spots may grow together and destroy the entire leaf.	Avoid wetting the leaves. Provide better growing conditions.
Leaf spot	Irregular to oval, brown to black spots with dark or tan centers. Spores are produced on the undersides of the leaves.	Avoid wetting leaves excessively. Destroy infected leaves. Protect healthy leaves with maneb 1 tbsp per gal water.
Rust	Pustules of powdery, yellow or orange spores on the undersides of the leaves.	Avoid wetting the leaves. Destroy infected leaves. Protect healthy leaves with maneb 1 tbsp per gal water.
Botrytis flower brown speck or rot *(Botrytis cinerea)*	Tiny, light-brown spots on the blossoms; may enlarge, rotting the entire flower. Wooly, gray fungus spores develop on flowers if kept moist.	Keep humidity as low as possible. Eliminate old flowers. Eliminate plant debris both inside and outside growing area.

VIRUS DISEASE CONTROL

VIRUS	SYMPTOMS	CONTROL
Severe flower break	Variegation of flower color. Also may cause distortion of sepals and petals. Leaves mottled with streaks of light- and dark-green tissue. Dark-green areas raised somewhat, producing ridges and bumps.	All the virus diseases are propagated with the plant. Once infected, plant remains so for life. Destroy infected plants. Control insects. Disinfect tools between cuts by soaking 1 minute in Clorox diluted 1 cupful to 9 cupfuls of water *or* heat-sterilize in a flame.

Mild flower break	Flowers less variegated than above and there is no distortion. Leaves show only mild mosaic symptoms, difficult to detect.
Symmetrical flower break	Variegation of the pigment occurs along the margins of the sepals except in the middle area. Leaves may develop an inconspicuous mosaic mottle.
Leaf necrosis	Irregular, elongated streaks of dead tissue on the undersurfaces of the older leaves. Some leaves may be killed or develop patterns of sunken, black tissue. Infected plants may show no symptoms. No flower variegation or distortion.
Vanda mosaic and flower break	Variegation of flower color; distortion of petals and sepals; inconspicuous mosaic mottle of leaf tips.
Blossom necrotic streak (may be due to a combination of viruses)	Brown spots or streaks become visible on blossoms about 1 week after opening. Long, yellowish, irregular streaks may develop on leaves.

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